

4-31617 seq listing.ST25.txt
SEQUENCE LISTING

<110> Novartis AG

<120> Induction of blood vessel formation through administration of polynucleotides encoding sphingosine kinases

<130> 4-31617

<160> 6

<170> PatentIn version 3.1

<210> 1

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<212> DNA

<213> Homo sapiens

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<221> CDS

<222> (1)..(1155)

<223>

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| gtg ctg gtg ctg ctg aac ccg cgc ggc ggc aag ggc aag gcc ttg cag | 96 |
| Val Leu Val Leu Leu Asn Pro Arg Gly Gly Lys Gly Lys Ala Leu Gln | |
| 20 25 30 | |
| ctc ttc cgg agt cac gtg cag ccc ctt ttg gct gag gct gaa atc tcc | 144 |
| Leu Phe Arg Ser His Val Gln Pro Leu Leu Ala Glu Ala Glu Ile Ser | |
| 35 40 45 | |
| ttc acg ctg atg ctc act gag cgg cgg aac cac gcg cgg gag ctg gtg | 192 |
| Phe Thr Leu Met Leu Thr Glu Arg Arg Asn His Ala Arg Glu Leu Val | |
| 50 55 60 | |
| cgg tcg gag gag ctg ggc cgc tgg gac gct ctg gtg gtc atg tct gga | 240 |

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|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-----|
| Arg 65 | Ser | Glu | Glu | Leu | Gly 70 | Arg | Trp | Asp | Ala | Leu 75 | Val | Val | Met | Ser | Gly 80 | |
| gac Asp | ggg Gly | ctg Leu | atg Met | cac His 85 | gag Glu | gtg Val | gtg Val | aac Asn | ggg Gly 90 | ctc Leu | atg Met | gag Glu | cgg Arg | cct Pro 95 | gac Asp | 288 |
| tgg Trp | gag Glu | acc Thr | gcc Ala 100 | atc Ile | cag Gln | aag Lys | ccc Pro | ctg Leu 105 | tgt Cys | agc Ser | ctc Leu | cca Pro | gca Ala 110 | ggc Gly | tct Ser | 336 |
| ggc Gly | aac Asn | gcg Ala 115 | ctg Leu | gca Ala | gct Ala | tcc Ser | ttg Leu 120 | aac Asn | cat His | tat Tyr | gct Ala | ggc Gly 125 | tat Tyr | gag Glu | cag Gln | 384 |
| gtc Val | acc Thr 130 | aat Asn | gaa Glu | gac Asp | ctc Leu | ctg Leu 135 | acc Thr | aac Asn | tgc Cys | acg Thr | cta Leu 140 | ttg Leu | ctg Leu | tgc Cys | cgc Arg | 432 |
| cgg Arg 145 | ctg Leu | ctg Leu | tca Ser | ccc Pro | atg Met 150 | aac Asn | ctg Leu | ctg Leu | tct Ser | ctg Leu 155 | cac His | acg Thr | gct Ala | tcg Ser | ggg Gly 160 | 480 |
| ctg Leu | cgc Arg | ctc Leu | ttc Phe | tct Ser 165 | gtg Val | ctc Leu | agc Ser | ctg Leu | gcc Ala 170 | tgg Trp | ggc Gly | ttc Phe | att Ile | gct Ala 175 | gat Asp | 528 |
| gtg Val | gac Asp | cta Leu | gag Glu 180 | agt Ser | gag Glu | aag Lys | tat Tyr | cgg Arg 185 | cgt Arg | ctg Leu | ggg Gly | gag Glu | atg Met 190 | cgc Arg | ttc Phe | 576 |
| act Thr | ctg Leu | ggc Gly 195 | acc Thr | ttc Phe | ctg Leu | cgt Arg | ctg Leu 200 | gca Ala | gcc Ala | ctg Leu | cgc Arg | acc Thr 205 | tac Tyr | cgc Arg | ggc Gly | 624 |
| cga Arg 210 | ctg Leu | gcc Ala | tac Tyr | ctc Leu | cct Pro | gta Val 215 | gga Gly | aga Arg | gtg Val | ggt Gly | tcc Ser 220 | aag Lys | aca Thr | cct Pro | gcc Ala | 672 |
| tcc Ser 225 | ccc Pro | gtt Val | gtg Val | gtc Val | cag Gln 230 | cag Gln | ggc Gly | ccg Pro | gta Val | gat Asp 235 | gca Ala | cac His | ctt Leu | gtg Val | cca Pro 240 | 720 |
| ctg Leu | gag Glu | gag Glu | cca Pro | gtg Val 245 | ccc Pro | tct Ser | cac His | tgg Trp | aca Thr 250 | gtg Val | gtg Val | ccc Pro | gac Asp | gag Glu 255 | gac Asp | 768 |
| ttt Phe | gtg Val | cta Leu | gtc Val 260 | ctg Leu | gca Ala | ctg Leu | ctg Leu | cac His 265 | tcg Ser | cac His | ctg Leu | ggc Gly | agt Ser 270 | gag Glu | atg Met | 816 |
| ttt Phe | gct Ala | gca Ala 275 | ccc Pro | atg Met | ggc Gly | cgc Arg | tgt Cys 280 | gca Ala | gct Ala | ggc Gly | gtc Val | atg Met 285 | cat His | ctg Leu | ttc Phe | 864 |
| tac Tyr | gtg Val 290 | cgg Arg | gcg Ala | gga Gly | gtg Val | tct Ser 295 | cgt Arg | gcc Ala | atg Met | ctg Leu | ctg Leu 300 | cgc Arg | ctc Leu | ttc Phe | ctg Leu | 912 |
| gcc Ala 305 | atg Met | gag Glu | aag Lys | ggc Gly | agg Arg 310 | cat His | atg Met | gag Glu | tat Tyr | gaa Glu 315 | tgc Cys | ccc Pro | tac Tyr | ttg Leu | gta Val 320 | 960 |

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| tat | gtg | ccc | gtg | gtc | gcc | ttc | cgc | ttg | gag | ccc | aag | gat | ggg | aaa | ggg | 1008 |
| Tyr | Val | Pro | Val | Val | Ala | Phe | Arg | Leu | Glu | Pro | Lys | Asp | Gly | Lys | Gly | |
| | | | 325 | | | | | | 330 | | | | | 335 | | |
| gtg | ttt | gca | gtg | gat | ggg | gaa | ttg | atg | ggt | agc | gag | gcc | gtg | cag | ggc | 1056 |
| Val | Phe | Ala | Val | Asp | Gly | Glu | Leu | Met | Val | Ser | Glu | Ala | Val | Gln | Gly | |
| | | | 340 | | | | | 345 | | | | | 350 | | | |
| cag | gtg | cac | cca | aac | tac | ttc | tgg | atg | gtc | agc | ggg | tgc | gtg | gag | ccc | 1104 |
| Gln | Val | His | Pro | Asn | Tyr | Phe | Trp | Met | Val | Ser | Gly | Cys | Val | Glu | Pro | |
| | | 355 | | | | | 360 | | | | | 365 | | | | |
| ccg | ccc | agc | tgg | aag | ccc | cag | cag | atg | cca | ccg | cca | gaa | gag | ccc | tta | 1152 |
| Pro | Pro | Ser | Trp | Lys | Pro | Gln | Gln | Met | Pro | Pro | Pro | Glu | Glu | Pro | Leu | |
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<400> 2

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| Met | Asp | Pro | Ala | Gly | Gly | Pro | Arg | Gly | Val | Leu | Pro | Arg | Pro | Cys | Arg | |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | | |
| Val | Leu | Val | Leu | Leu | Asn | Pro | Arg | Gly | Gly | Lys | Gly | Lys | Ala | Leu | Gln | |
| | | | 20 | | | | | 25 | | | | | 30 | | | |
| Leu | Phe | Arg | Ser | His | Val | Gln | Pro | Leu | Leu | Ala | Glu | Ala | Glu | Ile | Ser | |
| | | 35 | | | | | 40 | | | | | 45 | | | | |
| Phe | Thr | Leu | Met | Leu | Thr | Glu | Arg | Arg | Asn | His | Ala | Arg | Glu | Leu | Val | |
| | 50 | | | | | 55 | | | | | 60 | | | | | |
| Arg | Ser | Glu | Glu | Leu | Gly | Arg | Trp | Asp | Ala | Leu | Val | Val | Met | Ser | Gly | |
| 65 | | | | | 70 | | | | 75 | | | | | | 80 | |
| Asp | Gly | Leu | Met | His | Glu | Val | Val | Asn | Gly | Leu | Met | Glu | Arg | Pro | Asp | |
| | | | | 85 | | | | | 90 | | | | | 95 | | |
| Trp | Glu | Thr | Ala | Ile | Gln | Lys | Pro | Leu | Cys | Ser | Leu | Pro | Ala | Gly | Ser | |
| | | | 100 | | | | | 105 | | | | | 110 | | | |
| Gly | Asn | Ala | Leu | Ala | Ala | Ser | Leu | Asn | His | Tyr | Ala | Gly | Tyr | Glu | Gln | |
| | | 115 | | | | | 120 | | | | | 125 | | | | |

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Val Thr Asn Glu Asp Leu Leu Thr Asn Cys Thr Leu Leu Cys Arg
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Arg Leu Leu Ser Pro Met Asn Leu Leu Ser Leu His Thr Ala Ser Gly
145 150 155 160

Leu Arg Leu Phe Ser Val Leu Ser Leu Ala Trp Gly Phe Ile Ala Asp
165 170 175

Val Asp Leu Glu Ser Glu Lys Tyr Arg Arg Leu Gly Glu Met Arg Phe
180 185 190

Thr Leu Gly Thr Phe Leu Arg Leu Ala Ala Leu Arg Thr Tyr Arg Gly
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Arg Leu Ala Tyr Leu Pro Val Gly Arg Val Gly Ser Lys Thr Pro Ala
210 215 220

Ser Pro Val Val Val Gln Gln Gly Pro Val Asp Ala His Leu Val Pro
225 230 235 240

Leu Glu Glu Pro Val Pro Ser His Trp Thr Val Val Pro Asp Glu Asp
245 250 255

Phe Val Leu Val Leu Ala Leu Leu His Ser His Leu Gly Ser Glu Met
260 265 270

Phe Ala Ala Pro Met Gly Arg Cys Ala Ala Gly Val Met His Leu Phe
275 280 285

Tyr Val Arg Ala Gly Val Ser Arg Ala Met Leu Leu Arg Leu Phe Leu
290 295 300

Ala Met Glu Lys Gly Arg His Met Glu Tyr Glu Cys Pro Tyr Leu Val
305 310 315 320

Tyr Val Pro Val Val Ala Phe Arg Leu Glu Pro Lys Asp Gly Lys Gly
325 330 335

Val Phe Ala Val Asp Gly Glu Leu Met Val Ser Glu Ala Val Gln Gly
340 345 350

Gln Val His Pro Asn Tyr Phe Trp Met Val Ser Gly Cys Val Glu Pro
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Pro Pro Ser Trp Lys Pro Gln Gln Met Pro Pro Pro Glu Glu Pro Leu
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<210> 3

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<212> DNA

<213> Homo sapiens

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<221> CDS

<222> (1)..(1857)

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| 1 5 10 15 | |
| ggc gag ttt ggc tcc tac cca gcc cga ggc cca cgc ttt gcc ctc acc | 96 |
| Gly Glu Phe Gly Ser Tyr Pro Ala Arg Gly Pro Arg Phe Ala Leu Thr | |
| 20 25 30 | |
| ctt aca tcg cag gcc ctg cac ata cag cgg ctg cgc ccc aaa cct gaa | 144 |
| Leu Thr Ser Gln Ala Leu His Ile Gln Arg Leu Arg Pro Lys Pro Glu | |
| 35 40 45 | |
| gcc agg ccc cgg ggt ggc ctg gtc ccg ttg gcc gag gtc tca ggc tgc | 192 |
| Ala Arg Pro Arg Gly Gly Leu Val Pro Leu Ala Glu Val Ser Gly Cys | |
| 50 55 60 | |
| tgc acc ctg cga agc cgc agc ccc tca gac tca gcg gcc tac ttc tgc | 240 |
| Cys Thr Leu Arg Ser Arg Ser Pro Ser Asp Ser Ala Ala Tyr Phe Cys | |
| 65 70 75 80 | |
| atc tac acc tac cct cgg ggc cgg cgc ggg gcc cgg cgc aga gcc act | 288 |
| Ile Tyr Thr Tyr Pro Arg Gly Arg Arg Gly Ala Arg Arg Arg Ala Thr | |
| 85 90 95 | |
| cgc acc ttc cgg gca gat ggg gcc gcc acc tac gaa gag aac cgt gcc | 336 |
| Arg Thr Phe Arg Ala Asp Gly Ala Ala Thr Tyr Glu Glu Asn Arg Ala | |
| 100 105 110 | |
| gag gcc cag cgc tgg gcc act gcc ctc acc tgt ctg ctc cga gga ctg | 384 |
| Glu Ala Gln Arg Trp Ala Thr Ala Leu Thr Cys Leu Leu Arg Gly Leu | |
| 115 120 125 | |
| cca ctg ccc ggg gat ggg gag atc acc cct gac ctg cta cct cgg ccg | 432 |
| Pro Leu Pro Gly Asp Gly Glu Ile Thr Pro Asp Leu Leu Pro Arg Pro | |
| 130 135 140 | |
| ccc cgg ttg ctt cta ttg gtc aat ccc ttt ggg ggt cgg ggc ctg gcc | 480 |
| Pro Arg Leu Leu Leu Val Asn Pro Phe Gly Gly Arg Gly Leu Ala | |
| 145 150 155 160 | |
| tgg cag tgg tgt aag aac cac gtg ctt ccc atg atc tct gaa gct ggg | 528 |

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| Trp | Gln | Trp | Cys | Lys 165 | Asn | His | Val | Leu | Pro 170 | Met | Ile | Ser | Glu | Ala 175 | Gly | |
|-----|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------|
| ctg | tcc | ttc | aac | ctc | atc | cag | aca | gaa | cga | cag | aac | cac | gcc | cgg | gag | 576 |
| Leu | Ser | Phe | Asn 180 | Leu | Ile | Gln | Thr | Glu 185 | Arg | Gln | Asn | His | Ala 190 | Arg | Glu | |
| ctg | gtc | cag | ggg | ctg | agc | ctg | agt | gag | tgg | gat | ggc | atc | gtc | acg | gtc | 624 |
| Leu | Val | Gln 195 | Gly | Leu | Ser | Leu | Ser 200 | Glu | Trp | Asp | Gly | Ile 205 | Val | Thr | Val | |
| tcg | gga | gac | ggg | ctg | ctc | cat | gag | gtg | ctg | aac | ggg | ctc | cta | gat | cgc | 672 |
| Ser | Gly 210 | Asp | Gly | Leu | Leu | His 215 | Glu | Val | Leu | Asn | Gly 220 | Leu | Leu | Asp | Arg | |
| cct | gac | tgg | gag | gaa | gct | gtg | aag | atg | cct | gtg | ggc | atc | ctc | ccc | tgc | 720 |
| Pro | Asp | Trp | Glu | Glu | Ala 230 | Val | Lys | Met | Pro | Val 235 | Gly | Ile | Leu | Pro | Cys 240 | |
| ggc | tcg | ggc | aac | gcg | ctg | gcc | gga | gca | gtg | aac | cag | cac | ggg | gga | ttt | 768 |
| Gly | Ser | Gly | Asn | Ala 245 | Leu | Ala | Gly | Ala | Val 250 | Asn | Gln | His | Gly | Gly 255 | Phe | |
| gag | cca | gcc | ctg | ggc | ctc | gac | ctg | ttg | ctc | aac | tgc | tca | ctg | ttg | ctg | 816 |
| Glu | Pro | Ala | Leu 260 | Gly | Leu | Asp | Leu | Leu 265 | Leu | Asn | Cys | Ser | Leu 270 | Leu | Leu | |
| tgc | cgg | ggt | ggt | ggc | cac | cca | ctg | gac | ctg | ctc | tcc | gtg | acg | ctg | gcc | 864 |
| Cys | Arg | Gly 275 | Gly | Gly | His | Pro | Leu 280 | Asp | Leu | Leu | Ser | Val 285 | Thr | Leu | Ala | |
| tcg | ggc | tcc | cgc | tgt | ttc | tcc | ttc | ctg | tct | gtg | gcc | tgg | ggc | ttc | gtg | 912 |
| Ser | Gly 290 | Ser | Arg | Cys | Phe | Ser 295 | Phe | Leu | Ser | Val | Ala 300 | Trp | Gly | Phe | Val | |
| tca | gat | gtg | gat | atc | cag | agc | gag | cgc | ttc | agg | gcc | ttg | ggc | agt | gcc | 960 |
| Ser | Asp | Val | Asp | Ile | Gln 310 | Ser | Glu | Arg | Phe | Arg 315 | Ala | Leu | Gly | Ser | Ala 320 | |
| cgc | ttc | aca | ctg | ggc | acg | gtg | ctg | ggc | ctc | gcc | aca | ctg | cac | acc | tac | 1008 |
| Arg | Phe | Thr | Leu | Gly 325 | Thr | Val | Leu | Gly | Leu 330 | Ala | Thr | Leu | His | Thr 335 | Tyr | |
| cgc | gga | cgc | ctc | tcc | tac | ctc | ccc | gcc | act | gtg | gaa | cct | gcc | tcg | ccc | 1056 |
| Arg | Gly | Arg | Leu 340 | Ser | Tyr | Leu | Pro | Ala 345 | Thr | Val | Glu | Pro | Ala 350 | Ser | Pro | |
| acc | cct | gcc | cat | agc | ctg | cct | cgt | gcc | aag | tcg | gag | ctg | acc | cta | acc | 1104 |
| Thr | Pro | Ala 355 | His | Ser | Leu | Pro | Arg 360 | Ala | Lys | Ser | Glu | Leu 365 | Thr | Leu | Thr | |
| cca | gac | cca | gcc | ccg | ccc | atg | gcc | cac | tca | ccc | ctg | cat | cgt | tct | gtg | 1152 |
| Pro | Asp 370 | Pro | Ala | Pro | Pro | Met 375 | Ala | His | Ser | Pro | Leu 380 | His | Arg | Ser | Val | |
| tct | gac | ctg | cct | ctt | ccc | ctg | ccc | cag | cct | gcc | ctg | gcc | tct | cct | ggc | 1200 |
| Ser | Asp | Leu | Pro | Leu | Pro 390 | Leu | Pro | Gln | Pro | Ala 395 | Leu | Ala | Ser | Pro | Gly 400 | |
| tcg | cca | gaa | ccc | ctg | ccc | atc | ctg | tcc | ctc | aac | ggt | ggg | ggc | cca | gag | 1248 |
| Ser | Pro | Glu | Pro | Leu 405 | Pro | Ile | Leu | Ser | Leu 410 | Asn | Gly | Gly | Gly | Pro 415 | Glu | |

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|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
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| Leu | Ala | Gly | Asp | Trp | Gly | Gly | Ala | Gly | Asp | Ala | Pro | Leu | Ser | Pro | Asp | |
| | | | 420 | | | | | 425 | | | | | 430 | | | |
| cca | ctg | ctg | tct | tca | cct | cct | ggc | tct | ccc | aag | gca | gct | cta | cac | tca | 1344 |
| Pro | Leu | Leu | Ser | Ser | Pro | Pro | Gly | Ser | Pro | Lys | Ala | Ala | Leu | His | Ser | |
| | | 435 | | | | | 440 | | | | | 445 | | | | |
| ccc | gtc | tcc | gaa | ggg | gcc | ccc | gta | att | ccc | cca | tcc | tct | ggg | ctc | cca | 1392 |
| Pro | Val | Ser | Glu | Gly | Ala | Pro | Val | Ile | Pro | Pro | Ser | Ser | Gly | Leu | Pro | |
| | 450 | | | | | 455 | | | | | 460 | | | | | |
| ctt | ccc | acc | cct | gat | gcc | cgg | gta | ggg | gcc | tcc | acc | tgc | ggc | ccg | ccc | 1440 |
| Leu | Pro | Thr | Pro | Asp | Ala | Arg | Val | Gly | Ala | Ser | Thr | Cys | Gly | Pro | Pro | |
| 465 | | | | | 470 | | | | | 475 | | | | | 480 | |
| gac | cac | ctg | ctg | cct | ccg | ctg | ggc | acc | ccg | ctg | ccc | cca | gac | tgg | gtg | 1488 |
| Asp | His | Leu | Leu | Pro | Pro | Leu | Gly | Thr | Pro | Leu | Pro | Pro | Asp | Trp | Val | |
| | | | | 485 | | | | | 490 | | | | | 495 | | |
| acg | ctg | gag | ggg | gac | ttt | gtg | ctc | atg | ttg | gcc | atc | tcg | ccc | agc | cac | 1536 |
| Thr | Leu | Glu | Gly | Asp | Phe | Val | Leu | Met | Leu | Ala | Ile | Ser | Pro | Ser | His | |
| | | | 500 | | | | | 505 | | | | | 510 | | | |
| cta | ggc | gct | gac | ctg | gtg | gca | gct | ccg | cat | gcg | cgc | ttc | gac | gac | ggc | 1584 |
| Leu | Gly | Ala | Asp | Leu | Val | Ala | Ala | Pro | His | Ala | Arg | Phe | Asp | Asp | Gly | |
| | | 515 | | | | | 520 | | | | | 525 | | | | |
| ctg | gtg | cac | ctg | tgc | tgg | gtg | cgt | agc | ggc | atc | tcg | cgg | gct | gcg | ctg | 1632 |
| Leu | Val | His | Leu | Cys | Trp | Val | Arg | Ser | Gly | Ile | Ser | Arg | Ala | Ala | Leu | |
| | 530 | | | | | 535 | | | | | 540 | | | | | |
| ctg | cgc | ctt | ttc | ttg | gcc | atg | gag | cgt | ggt | agc | cac | ttc | agc | ctg | ggc | 1680 |
| Leu | Arg | Leu | Phe | Leu | Ala | Met | Glu | Arg | Gly | Ser | His | Phe | Ser | Leu | Gly | |
| 545 | | | | | 550 | | | | | 555 | | | | | 560 | |
| tgt | ccg | cag | ctg | ggc | tac | gcc | gcg | gcc | cgt | gcc | ttc | cgc | cta | gag | ccg | 1728 |
| Cys | Pro | Gln | Leu | Gly | Tyr | Ala | Ala | Ala | Arg | Ala | Phe | Arg | Leu | Glu | Pro | |
| | | | | 565 | | | | | 570 | | | | | 575 | | |
| ctc | aca | cca | cgc | ggc | gtg | ctc | aca | gtg | gac | ggg | gag | cag | gtg | gag | tat | 1776 |
| Leu | Thr | Pro | Arg | Gly | Val | Leu | Thr | Val | Asp | Gly | Glu | Gln | Val | Glu | Tyr | |
| | | | 580 | | | | | 585 | | | | | 590 | | | |
| ggg | ccg | cta | cag | gca | cag | atg | cac | cct | ggc | atc | ggt | aca | ctg | ctc | act | 1824 |
| Gly | Pro | Leu | Gln | Ala | Gln | Met | His | Pro | Gly | Ile | Gly | Thr | Leu | Leu | Thr | |
| | | 595 | | | | | 600 | | | | | 605 | | | | |
| ggg | cct | cct | ggc | tgc | ccg | ggg | cgg | gag | ccc | tga | | | | | | 1857 |
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<213> Homo sapiens

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35 40 45

Ala Arg Pro Arg Gly Gly Leu Val Pro Leu Ala Glu Val Ser Gly Cys
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Cys Thr Leu Arg Ser Arg Ser Pro Ser Asp Ser Ala Ala Tyr Phe Cys
65 70 75 80

Ile Tyr Thr Tyr Pro Arg Gly Arg Arg Gly Ala Arg Arg Arg Ala Thr
85 90 95

Arg Thr Phe Arg Ala Asp Gly Ala Ala Thr Tyr Glu Glu Asn Arg Ala
100 105 110

Glu Ala Gln Arg Trp Ala Thr Ala Leu Thr Cys Leu Leu Arg Gly Leu
115 120 125

Pro Leu Pro Gly Asp Gly Glu Ile Thr Pro Asp Leu Leu Pro Arg Pro
130 135 140

Pro Arg Leu Leu Leu Leu Val Asn Pro Phe Gly Gly Arg Gly Leu Ala
145 150 155 160

Trp Gln Trp Cys Lys Asn His Val Leu Pro Met Ile Ser Glu Ala Gly
165 170 175

Leu Ser Phe Asn Leu Ile Gln Thr Glu Arg Gln Asn His Ala Arg Glu
180 185 190

Leu Val Gln Gly Leu Ser Leu Ser Glu Trp Asp Gly Ile Val Thr Val
195 200 205

Ser Gly Asp Gly Leu Leu His Glu Val Leu Asn Gly Leu Leu Asp Arg
210 215 220

Pro Asp Trp Glu Glu Ala Val Lys Met Pro Val Gly Ile Leu Pro Cys
225 230 235 240

Gly Ser Gly Asn Ala Leu Ala Gly Ala Val Asn Gln His Gly Gly Phe
Page 8

245 4-31617 seq listing.ST25.txt 255

Glu Pro Ala Leu Gly Leu Asp Leu Leu Leu Asn Cys Ser Leu Leu Leu
260 265 270

Cys Arg Gly Gly Gly His Pro Leu Asp Leu Leu Ser Val Thr Leu Ala
275 280 285

Ser Gly Ser Arg Cys Phe Ser Phe Leu Ser Val Ala Trp Gly Phe Val
290 295 300

Ser Asp Val Asp Ile Gln Ser Glu Arg Phe Arg Ala Leu Gly Ser Ala
305 310 315 320

Arg Phe Thr Leu Gly Thr Val Leu Gly Leu Ala Thr Leu His Thr Tyr
325 330 335

Arg Gly Arg Leu Ser Tyr Leu Pro Ala Thr Val Glu Pro Ala Ser Pro
340 345 350

Thr Pro Ala His Ser Leu Pro Arg Ala Lys Ser Glu Leu Thr Leu Thr
355 360 365

Pro Asp Pro Ala Pro Pro Met Ala His Ser Pro Leu His Arg Ser Val
370 375 380

Ser Asp Leu Pro Leu Pro Leu Pro Gln Pro Ala Leu Ala Ser Pro Gly
385 390 395 400

Ser Pro Glu Pro Leu Pro Ile Leu Ser Leu Asn Gly Gly Gly Pro Glu
405 410 415

Leu Ala Gly Asp Trp Gly Gly Ala Gly Asp Ala Pro Leu Ser Pro Asp
420 425 430

Pro Leu Leu Ser Ser Pro Pro Gly Ser Pro Lys Ala Ala Leu His Ser
435 440 445

Pro Val Ser Glu Gly Ala Pro Val Ile Pro Pro Ser Ser Gly Leu Pro
450 455 460

Leu Pro Thr Pro Asp Ala Arg Val Gly Ala Ser Thr Cys Gly Pro Pro
465 470 475 480

Asp His Leu Leu Pro Pro Leu Gly Thr Pro Leu Pro Pro Asp Trp Val
485 490 495

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Thr Leu Glu Gly Asp Phe Val Leu Met Leu Ala Ile Ser Pro Ser His
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Leu Val His Leu Cys Trp Val Arg Ser Gly Ile Ser Arg Ala Ala Leu
530 535 540

Leu Arg Leu Phe Leu Ala Met Glu Arg Gly Ser His Phe Ser Leu Gly
545 550 555 560

Cys Pro Gln Leu Gly Tyr Ala Ala Ala Arg Ala Phe Arg Leu Glu Pro
565 570 575

Leu Thr Pro Arg Gly Val Leu Thr Val Asp Gly Glu Gln Val Glu Tyr
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Gly Pro Leu Gln Ala Gln Met His Pro Gly Ile Gly Thr Leu Leu Thr
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Gly Pro Pro Gly Cys Pro Gly Arg Glu Pro
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<223>

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Met Glu Pro Val Glu Cys Pro Arg Gly Leu Leu Pro Arg Pro Cys Arg
1 5 10 15

gtg ctg gtg ctg ctg aac ccc cag ggt ggc aag ggc aag gct ctg cag 96
Val Leu Val Leu Leu Asn Pro Gln Gly Gly Lys Gly Lys Ala Leu Gln
20 25 30

ctc ttc cag agc cgt gtg cag ccc ttc ctg gag gag gca gag ata acc 144
Leu Phe Gln Ser Arg Val Gln Pro Phe Leu Glu Glu Ala Glu Ile Thr
Page 10

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| 35 | 40 | 45 | |
|-------------------|-------------------|-------------------|-------------------|
| ttt Phe | aaa Lys 50 | ctg Leu | ata Ile |
| ctc Leu | acc Thr | gaa Glu 55 | cgg Arg |
| aag Lys | aac Asn | cat His | gcc Ala 60 |
| agg Arg | gag Glu | ctg Leu | gtg Val |
| 192 | | | |
| tgt Cys 65 | gca Ala | gag Glu | gag Glu |
| ttg Leu | ggt Gly 70 | cac His | tgg Trp |
| gac Asp | gcc Ala | ctg Leu 75 | gca Ala |
| gtc Val | atg Met | tcc Ser | ggt Gly 80 |
| 240 | | | |
| gat Asp | ggt Gly | ctg Leu | atg Met |
| cat His 85 | gag Glu | gtg Val | gtg Val |
| aat Asn | ggg Gly 90 | cta Leu | atg Met |
| gaa Glu | cgg Arg | ccc Pro | gac Asp 95 |
| 288 | | | |
| tgg Trp | gag Glu | act Thr | gcc Ala 100 |
| atc Ile | cag Gln | aaa Lys | ccc Pro |
| ctg Leu 105 | tgt Cys | agc Ser | ctc Leu |
| cct Pro | gga Gly 110 | ggc Gly | tcc Ser |
| 336 | | | |
| ggc Gly | aat Asn | gcg Ala 115 | ctg Leu |
| gca Ala | gct Ala | tct Ser | gtg Val 120 |
| aac Asn | cac His | tat Tyr | gct Ala |
| ggg Gly 125 | tac Tyr | gag Glu | cag Gln |
| 384 | | | |
| gtg Val | act Thr 130 | aat Asn | gaa Glu |
| gac Asp | ctg Leu | ctc Leu 135 | atc Ile |
| aac Asn | tgc Cys | aca Thr | ctg Leu 140 |
| 432 | | | |
| cgg Arg 145 | cgc Arg | ctg Leu | tca Ser |
| ccc Pro | atg Met 150 | aac Asn | ctg Leu |
| ctg Leu | tcc Ser | ctg Leu 155 | cac His |
| act Thr | gct Ala | tct Ser | ggg Gly 160 |
| 480 | | | |
| ctg Leu | cgg Arg | ctc Leu | tat Tyr |
| tct Ser 165 | gtg Val | ctc Leu | agt Ser |
| ctg Leu | tcc Ser 170 | tgg Trp | ggc Gly |
| ttt Phe | ggt Val | gct Ala 175 | gac Asp |
| 528 | | | |
| gtg Val | gac Asp | ctc Leu | gag Glu |
| agt Ser | gag Glu | aag Lys | tac Tyr |
| agg Arg 185 | cgc Arg | ttg Leu | ggg Gly |
| gag Glu | att Ile 190 | cgt Arg | ttc Phe |
| 576 | | | |
| aca Thr | gtg Val | ggc Gly 195 | acc Thr |
| ttc Phe | ttt Phe | cgc Arg | cta Leu 200 |
| gca Ala | agc Ser | ctg Leu | cgc Arg |
| atc Ile 205 | tac Tyr | caa Gln | ggc Gly |
| 624 | | | |
| caa Gln | ctg Leu 210 | gcc Ala | tac Tyr |
| ctt Leu | cct Pro | gta Val 215 | gga Gly |
| act Thr | gtg Val | gcc Ala | tct Ser 220 |
| aag Lys | aga Arg | ccc Pro | gcc Ala |
| 672 | | | |
| tct Ser 225 | aca Thr | cac His | ctt Leu |
| ggt Val | atg Met | cat His | gtg Val |
| gag Glu | gct Ala | ggt Gly | ggt Val |
| gag Glu | ggt Gly | ggt Val | ggt Val |
| 720 | | | |
| gag Glu | gag Glu | cca Pro | gaa Glu |
| cag Gln | gac Asp 255 | ttt Phe | |
| 768 | | | |
| gtc Val | ctg Leu | gtg Val | ctg Leu |
| ctg Leu | gtg Val | ctg Leu | cta Leu |
| cac His | acc Thr 265 | cac His | ctg Leu |
| agc Ser | tcc Ser | gag Glu 270 | ctg Leu |
| 816 | | | |
| gca Ala | gca Ala | ccc Pro 275 | atg Met |
| ggc Gly | cgc Arg | tgt Cys | gag Glu 280 |
| gct Ala | ggt Gly | ggt Val | atg Met |
| cat His 285 | ctg Leu | ttc Phe | tac Tyr |
| 864 | | | |
| gta Cgt | gca Gly | ggg Gly | gtg Tca |
| agg Gct | gca Gly | ctg Gly | ctg Gly |
| 912 | | | |

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| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|--|
| Val | Arg | Ala | Gly | Val | Ser | Arg | Ala | Ala | Leu | Leu | Arg | Leu | Phe | Leu | Ala | | |
| | 290 | | | | | 295 | | | | | 300 | | | | | | |
| atg | cag | aag | ggc | aag | cat | atg | gaa | ctt | gac | tgt | cca | tac | ctg | gtt | cat | 960 | |
| Met | Gln | Lys | Gly | Lys | His | Met | Glu | Leu | Asp | Cys | Pro | Tyr | Leu | Val | His | | |
| | 305 | | | | 310 | | | | | 315 | | | | | 320 | | |
| gtg | ccc | gtg | gtt | gct | ttc | cgc | ctg | gag | ccc | agg | agc | cag | agg | ggc | gtg | 1008 | |
| Val | Pro | Val | Val | Ala | Phe | Arg | Leu | Glu | Pro | Arg | Ser | Gln | Arg | Gly | Val | | |
| | | | | 325 | | | | | 330 | | | | | 335 | | | |
| ttt | tct | gtg | gat | gga | ggg | ctg | atg | gta | tgt | gaa | gct | gtg | cag | ggc | caa | 1056 | |
| Phe | Ser | Val | Asp | Gly | Gly | Leu | Met | Val | Cys | Glu | Ala | Val | Gln | Gly | Gln | | |
| | | | 340 | | | | | 345 | | | | | 350 | | | | |
| gtg | cac | cca | aac | tac | ctt | tgg | atg | gtc | tgt | ggc | agc | aga | gat | gcc | cca | 1104 | |
| Val | His | Pro | Asn | Tyr | Leu | Trp | Met | Val | Cys | Gly | Ser | Arg | Asp | Ala | Pro | | |
| | | 355 | | | | | 360 | | | | | 365 | | | | | |
| tcc | ggc | cgg | gac | tcc | cgg | cgg | ggg | cca | cct | cca | gaa | gaa | cca | taa | | 1149 | |
| Ser | Gly | Arg | Asp | Ser | Arg | Arg | Gly | Pro | Pro | Pro | Glu | Glu | Pro | | | | |
| | 370 | | | | | 375 | | | | | 380 | | | | | | |

<210> 6

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<212> PRT

<213> Mus musculus

<400> 6

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| Met | Glu | Pro | Val | Glu | Cys | Pro | Arg | Gly | Leu | Leu | Pro | Arg | Pro | Cys | Arg |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Val | Leu | Val | Leu | Leu | Asn | Pro | Gln | Gly | Gly | Lys | Gly | Lys | Ala | Leu | Gln |
| | | | 20 | | | | | 25 | | | | | 30 | | |
| Leu | Phe | Gln | Ser | Arg | Val | Gln | Pro | Phe | Leu | Glu | Glu | Ala | Glu | Ile | Thr |
| | | 35 | | | | 40 | | | | | | 45 | | | |
| Phe | Lys | Leu | Ile | Leu | Thr | Glu | Arg | Lys | Asn | His | Ala | Arg | Glu | Leu | Val |
| | 50 | | | | | 55 | | | | | 60 | | | | |
| Cys | Ala | Glu | Glu | Leu | Gly | His | Trp | Asp | Ala | Leu | Ala | Val | Met | Ser | Gly |
| 65 | | | | | 70 | | | | 75 | | | | | | 80 |
| Asp | Gly | Leu | Met | His | Glu | Val | Val | Asn | Gly | Leu | Met | Glu | Arg | Pro | Asp |
| | | | | 85 | | | | | 90 | | | | | 95 | |
| Trp | Glu | Thr | Ala | Ile | Gln | Lys | Pro | Leu | Cys | Ser | Leu | Pro | Gly | Gly | Ser |
| | | | 100 | | | | | 105 | | | | | 110 | | |

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Gly Asn Ala Leu Ala Ala Ser Val Asn His Tyr Ala Gly Tyr Glu Gln
115 120 125

Val Thr Asn Glu Asp Leu Leu Ile Asn Cys Thr Leu Leu Leu Cys Arg
130 135 140

Arg Arg Leu Ser Pro Met Asn Leu Leu Ser Leu His Thr Ala Ser Gly
145 150 155 160

Leu Arg Leu Tyr Ser Val Leu Ser Leu Ser Trp Gly Phe Val Ala Asp
165 170 175

Val Asp Leu Glu Ser Glu Lys Tyr Arg Arg Leu Gly Glu Ile Arg Phe
180 185 190

Thr Val Gly Thr Phe Phe Arg Leu Ala Ser Leu Arg Ile Tyr Gln Gly
195 200 205

Gln Leu Ala Tyr Leu Pro Val Gly Thr Val Ala Ser Lys Arg Pro Ala
210 215 220

Ser Thr Leu Val Gln Lys Gly Pro Val Asp Thr His Leu Val Pro Leu
225 230 235 240

Glu Glu Pro Val Pro Ser His Trp Thr Val Val Pro Glu Gln Asp Phe
245 250 255

Val Leu Val Leu Val Leu Leu His Thr His Leu Ser Ser Glu Leu Phe
260 265 270

Ala Ala Pro Met Gly Arg Cys Glu Ala Gly Val Met His Leu Phe Tyr
275 280 285

Val Arg Ala Gly Val Ser Arg Ala Ala Leu Leu Arg Leu Phe Leu Ala
290 295 300

Met Gln Lys Gly Lys His Met Glu Leu Asp Cys Pro Tyr Leu Val His
305 310 315 320

Val Pro Val Val Ala Phe Arg Leu Glu Pro Arg Ser Gln Arg Gly Val
325 330 335

Phe Ser Val Asp Gly Gly Leu Met Val Cys Glu Ala Val Gln Gly Gln
340 345 350

Val His Pro Asn Tyr Leu Trp Met Val Cys Gly Ser Arg Asp Ala Pro
355 360 365

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| | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ser | Gly | Arg | Asp | Ser | Arg | Arg | Gly | Pro | Pro | Pro | Glu | Glu | Pro |
| | 370 | | | | | 375 | | | | | 380 | | |